

REMARKS

I. Introduction

Claims 16 to 31 are pending in the present application. In view of the following remarks, it is respectfully submitted that all of the presently pending claims are allowable. Reconsideration is respectfully requested.

Applicant notes with appreciation the acknowledgment of the claim for foreign priority and the indication that all of the certified copies of the priority documents have been received.

II. Rejection of Claims 16 to 27 and 29 to 31 Under 35 U.S.C. § 103(a)

Claims 16 to 27 and 29 to 31 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,210,641 (“Yamada”) in view of U.S. Patent Application Publication No. 2002/0017461 (“Kunimoto”). Applicant respectfully submits that the combination of Yamada and Kunimoto does not render unpatentable the pending claims for at least the following reasons.

Claim 16 relates to a sensor element for a sensor for determining an oxygen concentration in an exhaust gas of an internal combustion engine, the sensor element comprising, in relevant part, a solid electrolyte having a cavity formed inside, a prechamber formed inside a solid electrolyte, the prechamber having an access opening for the exhaust gas, a diffusion channel formed inside the solid electrolyte, the diffusion channel comprising an intake opening toward the prechamber and an exit opening toward the cavity, the diffusion channel being filled with a diffusion barrier, and a catalytic converter located in the prechamber. The Office Action concedes that Yamada fails to teach a prechamber containing a catalytic converter and diffusion channel which feeds from the prechamber to the cavity. The Office Action relies on Kunimoto as disclosing these features that are lacking from Yamada.

The combination of Yamada and Kunimoto, however, does not disclose, or even suggest, the prechamber having the catalytic converter and the diffusion channel having the diffusion barrier of claim 16. The Office Action refers the porous member 25 of Kunimoto as a catalytic converter, while also indicating that the flow is controlled with the porous member 25, thereby acting as a diffusion barrier. As clearly indicated in claim 16, the diffusion barrier is located in the diffusion channel and the catalytic converter is located in the prechamber. As such, these structures are distinct. The lone structure of the porous

member 25 of Kunimoto cannot be viewed as a disclosure, or even a suggestion, both the diffusion barrier and the catalytic converter of claim 16.

As a result, Yamada in view of Kunimoto does not address the problem that is addressed in the present application. As indicated in the specification at page 1, line 39 to page 2, line 34, the present application is centered around the diffusion coefficient of hydrocarbons and oxygen. The structure of the present application, having the catalytic converter located in a prechamber that feeds through a diffusion chamber with a diffusion barrier into a cavity, is such that the different diffusion coefficient of hydrocarbons of various molecular weight affects the reading of the sensor. The aspect of the detection process that is being controlled is the diffusion of the gas being detected. The present application is directed to working towards a more unified diffusion coefficient of the diffusing gas, leading to a more correct lambda value. The cited references, on the other hand, are only organized to feed the gas through the catalytic material. Any gas that emerges from the catalytic material of the cited references would not find a diffusion barrier to regulate the flow between a prechamber and a cavity, via a diffusion channel. Such a downstream diffusion barrier is not disclosed or suggested the references, therefore the diffusion coefficient problem does not arise and the references do not disclose, or even suggest, any solution.

Further, the Office Action asserts that Kunimoto, at paragraph 0038, discloses that the gas diffusion hole 6 can be loaded with a porous member to control the flow. Paragraph 0038 of Kunimoto, however, merely discloses that gas treatment chamber 5 may be loaded with the porous member 25. Figure 1 of Kunimoto shows porous member 25 within gas treatment chamber 5, and not gas diffusion hole 6. Gas diffusion hole 6 is not loaded with a porous member, and therefore any flow control performed by the gas diffusion hole 6 is permitted at the same speed, regardless of the gas component. The gas does not contain completely oxidized hydrocarbons, and the components of the gas have unknown concentrations. This results in oxidation dynamics that are not exactly known, which affects the reading of the measured values of the sensor. In contrast, the present application only permits completely oxidized reaction products enter the diffusion barrier, such as water and carbon dioxide. The diffusion coefficients of these oxidized reaction products are known, and therefore the measured values of the sensor may be interpreted correctly.

As such, the combination of Yamada and Kunimoto does not disclose, or suggest, all of the features of claim 16.

Claims 17 to 26 depend from claim 16 and therefore incorporate all of the features of claim 16. For at least the reasons set forth above with respect to claim 16, the

combination of Yamada and Kunimoto does not render unpatentable dependent claims 17 to 26.

Claim 27 is directed to substantially the same subject matter as claim 16. Claims 29 to 31 depend from claim 27 and therefore include all of the features of claim 27. For at least the reasons set forth above with respect to claim 16, the combination of Yamada and Kunimoto does not render unpatentable independent claim 27 or its dependent claims 29 to 31.

Withdrawal of this rejection is respectfully requested.

III. Rejection of Claim 28 Under 35 U.S.C. § 103(a)

Claim 28 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of Kunimoto further in view of U.S. Patent Application Publication No. 2002/0092780 ("Nadanami"). Applicant respectfully submits that the combination of Yamada, Kunimoto and Nadanami does not render unpatentable the pending claims for at least the following reasons.

Claim 28 depends from claim 27 and therefore includes all of the features of claim 27. As more fully set forth above with respect to claim 27, the combination of Yamada and Kunimoto does not disclose, or even suggest, all of the features of claim 27. Nadanami does not cure the critical deficiencies of Yamada and Kunimoto. As such, the combination of Yamada, Kunimoto and Nadanami does not render unpatentable dependent claim 28.

Withdrawal of this rejection is respectfully requested.

IV. Conclusion

It is therefore respectfully submitted that all of the presently pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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